

Highlights

Sales of Fuel Oil and Kerosene in 2002

The absence of fuel switching opportunities, a somewhat sluggish economy, and a milder winter than normal combined to reduce demand in a number of oil consuming sectors and resulted in the first drop in distillate sales in more than a decade. Total distillate sales fell slightly (0.9 percent) by 569 million gallons from the all-time high set in 2001 to 59.3 billion gallons.

In 2001 sales of residual fuel surged, boosted by significant volumes of fuel switching. In 2002, without the fuel switching, residual fuel oil sales fell sharply (23.9 percent) in a continuation of the long-term trend of declining sales of heavy fuel oil. Sales of kerosene also fell sharply (40.1 percent) from the all-time high of 2001.

The relatively small decrease in distillate sales, combined with sizable drops in sales of residual fuel oil and kerosene, resulted in distillate sales accounting for a considerably larger share of the overall fuel oil market in 2002 compared to 2001. In 2002 distillate sales accounted for 84.3 percent of total sales, compared to 80.3

percent in 2001. In 2002 sales of residual fuel oil accounted for 14.7 percent of total sales, down from 18.2 percent in 2001. Sales of kerosene accounted for the remaining 0.9 percent, compared to 1.5 percent of total sales in 2001.¹

Distillate Fuel Oil

For the first time in more than a decade, sales of distillate fuel oil fell. Sales totaled 59.3 billion gallons, a drop of 569 million gallons from the all-time high set the preceding year and nearly 260 million gallons below the total volume of distillate sold in 2000. Although the drop in sales is the first in more than a decade, it should be noted within the context of what occurred in 2001, when the distillate sales increase was the smallest of the previous decade (approximately 310 million gallons) and represented only about one-fifth of the average increase of the previous 10 years.²

Table HL1. Volume Distribution of Distillate and Residual Fuel Oils, 2001 and 2002

| Energy Use | Distillate 2002 | | Distillate 2001 | | Residual 2002 | | Residual 2001 | |
|------------------------|--------------------------|---------------|--------------------------|---------------|--------------------------|---------------|--------------------------|---------------|
| | Volume (million gallons) | Percent Share |
| Residential | 6,377 | 10.8 | 6,643 | 11.1 | — | — | — | — |
| Commercial | 3,293 | 5.5 | 3,718 | 6.2 | 572 | 5.6 | 648 | 4.8 |
| Industrial | 2,384 | 4.0 | 2,466 | 4.1 | 1,251 | 12.4 | 1,747 | 12.8 |
| Oil Company | 771 | 1.3 | 748 | 1.2 | 109 | 1.1 | 132 | 1.0 |
| Farm | 3,418 | 5.8 | 3,584 | 6.0 | — | — | — | — |
| Electric Power | 751 | 1.3 | 1,344 | 2.2 | 3,575 | 34.5 | 5,647 | 41.5 |
| Railroad | 3,245 | 5.5 | 3,040 | 5.1 | — | — | — | — |
| Vessel Bunkering | 2,079 | 3.5 | 2,044 | 3.4 | 4,848 | 46.8 | 5,409 | 39.7 |
| On-Highway | 34,309 | 57.8 | 33,215 | 55.4 | — | — | — | — |
| Military | 357 | 0.6 | 401 | 0.7 | 4 | 0.0 | 20 | 0.1 |
| Off-Highway | 2,358 | 4.0 | 2,708 | 4.5 | — | — | — | — |
| Other | 0 | 0.0 | 0 | 0.0 | 3 | 0.0 | 5 | 0.0 |
| Total | 59,343 | | 59,911 | | 10,362 | | 13,609 | |

Notes: Totals may not equal sum of components due to independent rounding.

Sources: Energy Information Administration, Form EIA-821, "Annual Fuel Oil and Kerosene Sales Report," 2000 and 2001.

¹Numbers may not sum to 100 percent due to rounding.

²The average increase during the period 1991-2001 was 1.47 billion gallons. Distillate sales increased by more than 2.0 billion gallons in both 1999 and 2000.

In 2002 a number of factors had a negative influence on the volume of distillate fuel sold. First, and by far the most significant impact on sales, was the change in the relationship between prices of natural gas and distillate fuel oil. During the winter of 2001 unusually expensive natural gas made fuel switching from gas to oil attractive to any consumers having that option. During the winter of 2002, with more moderate natural gas prices, the opportunity for fuel switching disappeared. Sales of distillate fuel oil to the industrial and commercial sectors, and especially to the electric power sector, fell sharply as a result. Sales of distillate fuel to the industrial sector fell by 3.3 percent and sales to the electric power sector plunged by 44.1 percent.³

Second, even as the economy showed signs of improving from the slowdown in 2001, some economic indicators and some sectors of the economy lagged. Despite strong demand for oil products in some sectors, demand was negatively impacted in other areas of the economy.

Although overall Gross Domestic Product (GDP), a prime measure of the state of the economy, increased by 2.4 percent in constant dollars, unemployment also increased from 4.7 to 5.8 percent.⁴ In addition, even though total energy consumption in the United States increased by 1.4 percent from 96.32 quads during 2001 to 97.622 quads in 2002, the overall increase only partially offset the drop that occurred in 2001. Total energy consumption in 2002 remained approximately 1.3 quads below the all-time high rate of 98.942 quads in 2000.⁵ Further, industrial production and capacity utilization rates fell, and the overall value of new construction also fell slightly. A drop of 23.4 percent in the value of new commercial and industrial construction more than offset the 6.8 percent increase in new residential construction that was spurred by low interest rates.

Third, weather also played a role in lowering distillate demand in 2002. On the surface, since the number of heating degree days in 2001 and 2002 was almost identical, with 2002 having a slightly higher total, it

could be inferred that there should be little difference in the demand for sales of distillate between the two years and that a small increase in sales in 2002 could be expected. Yet sales fell sharply in 2002, partly due to differences in the weather. Major differences in the day-to-day peak demand for electricity are much more significant than the raw totals. Many days in the first quarter of 2001 were significantly colder than in 2002, especially in the primary oil-burning areas of the U.S. (New England, Central Atlantic and East North Central). These three areas were 15 to 25 percent colder in the first quarter of 2001 than was the case in 2002.

Further, although weather impacts residential and commercial use of distillate, the weather has the greatest effect on the use of distillate as a peaking fuel by electric generators. Such units are used in the winter when it is very cold and when interruptible contract provisions are triggered, forcing some users of natural gas to switch to alternatives. Consequently, in 2002 the weather and a number of different factors combined to limit sales of distillate to the electric power sector, where sales plunged by nearly 600 million gallons (44.1 percent). These other factors in 2002 included: the absence of incentives or any opportunities for fuel switching; increased natural gas capacity in the electric power sector; increased generation of electricity by hydroelectric plants; and only a small increase in demand for electricity.

Finally, and to a limited extent, considerably warmer than normal summer weather helped limit the drop in demand for distillate as some electric power producers used distillate fuel to run peaking facilities as they strove to meet peak summer cooling needs.⁶ For example, in New England and the Lower Atlantic, a number of electric power generators reported using higher volumes of distillate to produce electricity to meet peak summer demand.⁷

The transportation sector fared far better in 2002 than was the case in 2001 when distillate sales dropped due to the aftermath of the September 11 attacks. In fact, sales of distillates for use as bunker fuel, for railroads,

³ Although sales to the commercial sector dropped (11.4 percent), differing weather conditions, installation of new gas-fired equipment, and conversion of existing facilities played a more significant role in the decline than did the absence of fuel switching.

⁴ *Economic Indicators*, September 2003, Washington D.C. U.S. Government Printing Office, p. 12. (Data are adjusted for inflation using 1996 as the base).

⁵ One quad equals one quadrillion (a one followed by fifteen zeros) British thermal units (Btu). Source EIA, *Monthly Energy Review*, October 2003, Table 2.1.

⁶ The summer of 2002 was both warmer than the summer of 2001 and considerably warmer than normal. Temperatures during the summer as measured by cooling degree days were warmer than normal in all regions of the country. In three census regions, the number of cooling degree days were slightly above normal, ranging between 3.5 and 6.9 percent above normal; two regions were moderately warmer than normal by as much as 15.8 percent warmer; and in four regions the number of cooling degree days was significantly higher than normal, by as much as 35 percent.

⁷ Smaller peaking units, especially older units are often combustion turbines (in some cases converted jet turbine engines that run on No 2 fuel oil).

and for on-highway diesel all increased and the combined sales to the transportation sector accounted for 66.8 percent of total distillate sales compared to about 63.9 percent in 2001. Sales of on-highway diesel increased by more than one billion gallons or 3.3 percent; although the magnitude of that increase is large, particularly in comparison to the increase that occurred in 2001, it is similar in magnitude to the increase in 2000 and only somewhat more than half the size of the increase that occurred in 1999. Sales of railroad diesel increased by nearly 206 million gallons (6.8 percent) and sales of distillate bunker fuel increased slightly rising 34.9 million gallons (1.7 percent).

The impact on sales of the changing relationship between natural gas and oil prices and changing fuel use patterns can be seen in the commercial sector where distillate sales fell for the first time since 1998, falling by 11.4 percent (approximately 425 million gallons). At the same time, sales of natural gas to commercial consumers, which had fallen by 4.6 percent in 2001, increased by 2.8 percent in 2002. The increased use of natural gas in 2002 came about with the absence of fuel switching on the part of those commercial consumers with the ability to switch and the increase in natural gas demand to meet the number of both new gas-fired heating applications as well as the on-going process of conversion of existing heating equipment from oil to natural gas. Reflecting the overall drop in energy use in the industrial sector, and the impact of lower natural gas prices on fuel switching opportunities, sales of distillate fuel for use in industrial applications dropped by 82 million gallons (3.3 percent).

In 2002, weather, the ever present and often dominant factor in influencing fuel sales to the agricultural sector, negatively impacted the production of a number of the major crops including wheat, corn, and soybeans. Drier, hotter weather and, in some cases, severe drought conditions played the major role in reducing the production of soybeans by 6 percent, corn by 5 percent and wheat by 17 percent.⁸ As the volume of crops harvested shrank, the volume of distillate sold to the agricultural sector also fell, dropping by 166 million gallons (4.6 percent).

Although low interest rates helped boost construction of new residential units by 6.8 percent, lingering eco-

nomie problems and the growth in unemployment, contributed to depressed distillate sales to the off-highway and the construction sectors.⁹ Due to the drop in the value of new commercial and industrial construction of 23.4 percent, sales of distillate fuel oil for construction and off-highway uses fell by 350 million gallons (12.9 percent).

Despite a drop in the number of operating drilling rigs of nearly 28 percent and the credit crunch that led to budget cuts by some energy companies, oil company direct use of distillate fuel increased slightly during 2002. The number of active drilling rigs continued to fall through April when the level reached 750, the lowest number since October 1999. After April, the number of rigs increased, slowly at first but continuing throughout the remainder of the year. By December, the number of rigs was only 5 percent below the number in operation during December of 2001. Not unexpectedly, given the circumstances, the increase in distillate sales for oil company use was less than half the size of the increase that occurred in 2001. In 2002, sales increased by 24 million gallons (3.1 percent) compared to an increase of 61.2 million gallons (8.9 percent) in 2001.¹⁰

On a regional basis, sales of distillate to the home heating oil sector decreased in PAD Districts 1, 2, 4 and 5.¹¹ Sales in PAD District 1 (East Coast), fell the most, decreasing by approximately 215 million gallons (3.7 percent). Sales of home heating oil fell in each of the three subdistricts, by 33 million gallons in New England, by 157 million gallons in Central Atlantic, and by approximately 24 million gallons in Lower Atlantic. Sales also fell in PAD District 2 by approximately 27 million gallons; in PAD District 4 (Rocky Mountain) sales dropped by approximately 4 million gallons; and in PAD District 5 (West Coast) sales fell by 21 million gallons. Sales in PAD District 3 (Gulf Coast) increased sharply, by nearly 29 percent, however, on a volumetric basis sales, increased by less than one million gallons compared to the level of sales achieved in 2001.

Sales to the commercial sector fell throughout all regions of the U.S. without exception. Sales fell the most in the Lower Atlantic portion of PAD District 1 and in

⁸Department of Agriculture, National Agricultural Statistics Service, *Statistical Highlights 2003: Overview, U.S. Crop Summary*, p. 68 and ff.

⁹*Economic Indicators*, April 2003, Washington, D.C. U.S. Government Printing Office, p. 12.

¹⁰Baker Hughes, North American Rig Counts, U.S. Monthly Averages by State 1992-2003, (http://www.bakerhughes.com/investor/rig/rig_na.htm).

¹¹The U.S. is divided into 5 Petroleum Administration for Defense Districts (PAD Districts). District 1, East Coast, District 2, Midwest, District 3, Gulf Coast, District 4, Rocky Mountain, and District 5, West Coast. PAD District 1 is broken into three subdistricts: Subdistrict 1A, New England, Subdistrict 1B, Central Atlantic, and Subdistrict 1C, Lower Atlantic.

PAD District 2; sales fell the least in the Central Atlantic portion of PAD District 1 and in the Rocky Mountain region, PAD District 4. To some extent, the decline reflects the absence of fuel switching opportunities and changing fuel use patterns including conversion of some commercial establishments from oil to natural gas.¹²

In 2002, sales of distillate to the industrial sector decreased generally, falling throughout the nation with the exception of PAD District 4 and PAD District 1C. Sales increased by 53.3 million gallons in the Lower Atlantic and by 7.1 million gallons in the Rocky Mountain region. Sales fell the most in PAD District 5 (by 80.5 million gallons) and in PAD District 1B (by 38.2 million gallons).

Unlike 2001, when the events of September 11 and support activity for the action in Afghanistan boosted sales to the military, during 2002 sales dropped by nearly 44 million gallons (10.9 percent). The drop in sales was particularly acute in PAD District 2 where sales fell by nearly one-half (8.9 million gallons). The largest drop in volume took place in PAD District 3 where sales fell by 22.2 million gallons (20.8 percent). Sales improved in only two areas, PAD District 4 and in PAD District 1B which includes Washington, D.C.. Sales increased in the Rocky Mountain region by 0.8 million gallons and by 2.3 million gallons in the Central Atlantic region.

The adverse weather conditions that resulted in a drop in sales to the farm sector nationally, were widespread regionally. Sales to the agricultural sector fell in all five PAD Districts as warm dry weather and drought in several states resulted in poor harvests and correspondingly reduced demand for fuels for processing and harvesting. Sales in PAD District 2 which includes several of the major agricultural states, fell the most (88.3 million gallons). The second largest drop in volume occurred in PAD District 5 (West Coast), which includes California, the leading agricultural state in terms of the value of the crop production. Sales in PAD District 5 fell by just under 50 million gallons. The single exception to the pattern of falling sales occurred in New England, where warmer than normal weather conditions helped to boost production and consequently demand for fuel. Sales in New England increased by approximately 3.4 million gallons (11.9 percent).

Although distillate sales to the electric power sector fell sharply in all regions of the country, sales fell the most in PAD District 1C by 146 million gallons (41.3 percent), and in PAD District 3 (Gulf Coast) where sales dropped by 291 million gallons (79.9 percent).

Residual Fuel Oil

Natural gas prices typically increase with the approach of winter, however, during the winter of 2001, natural gas prices surged to record levels and, as a consequence, consumers with the ability to switch from gas to oil did so in large numbers leading to sharp increases in the sales of residual fuel oil to industrial and large commercial consumers and, in particular, to electric power producers. In 2002 as natural gas prices moderated, price differentials between natural gas and oil returned to a more typical relationship; with no window of opportunity opening, significantly less fuel switching occurred and total sales of residual fuel oil plunged, dropping by nearly 3.2 billion gallons (23.9 percent).

Although the magnitude of the drop in the volume is very large, it should be viewed in the context of the unusual circumstances that contributed to the significant increase in volume in 2001. In apparent contradiction to the long-term trend of decline, total sales of residual fuel oil increased during 2001. However, a close examination of the data leads to the conclusion that sales increased as the result of unusually high prices for natural gas that led, in turn, to significant volumes of fuel-switching and resulted in a surge in demand in the industrial and electric power sectors sufficient to overcome losses in other areas of the market. In 2001, with the exception of sales to those two sectors, residual fuel oil sales fell by more than 1 billion gallons. Consequently, absent the unusual circumstances in play in 2001, it is not surprising that sales of residual fuel oil dropped sharply during 2002.

The drop in sales continued a trend of more than a decade that reflects both factors within in the energy sector and externalities as well. Between 1989 and 2002, total sales of residual fuel oil have fallen by more than 52.5 percent. A number of factors contributed to this sustained and general decline in the production of and demand for residual fuel oil. Among the principle reasons for the decline are: changing crude oil specifications and increased refinery sophistication resulting in

¹²Some sales of distillate fuel for use in school buses were reclassified from commercial to the on-road category.

increased production of gasoline and distillate at the expense of production of heavier products such as residual fuel oil.¹³ In addition, environmental constraints and restrictions on fuel oil use, and availability of abundant, relatively inexpensive natural gas have contributed to a diminished use of residual fuel oil in the production of electric power.¹⁴ For residual fuel oil, although the overall trend is down, significant fluctuations in the amount of fuel sold will occur whenever price differentials make switching attractive and whenever interruptible gas contracts take effect during the coldest winter periods.

In 2002, sales to the electric power sector plunged, falling throughout the country. By far, the largest drop in sales for electric power generation occurred in Central Atlantic and Lower Atlantic portions of PAD District 1 where the sales increase of 2001 had been the largest. Sales plunged by 621 million gallons (47.6 percent) in Central Atlantic, and by 628 million gallons (23.6 percent) in Lower Atlantic. In PAD District 5 sales of residual fuel for the generation of electric power fell by 78 million gallons (14.3 percent). This compares to the situation that existed in 2001, when natural gas prices reached unusually high levels leading to an increase of residual fuel oil use for electric power of 29.5 percent. Residual fuel oil was delivered to California and Arizona by rail from the Gulf Coast, by ship from the Orient, and even by truck to supply fuel to some power plants in the region.

Sales of residual fuel to the bunker fuel market continued to fall. Although sales dropped by 562 million gallons (10.4 percent), the amount of the decline was nonetheless considerably smaller than was the case in 2001 when sales fell by 1 billion gallons. However, it should be noted that at least some portion of the apparent drop in sales during 2001 resulted from reporting errors in the past that included sales for resale along with actual bunker sales data.

Although sales for direct use by oil companies fell by 17.8 percent nationally, that figure may be somewhat misleading. Sales increased in PAD Districts 3, 4 and 5 as well as in New England and Lower Atlantic por-

tions of PAD District 1. Sales fell sharply in PAD District 2 (down by 41.7 percent) and in the Central Atlantic portion of PAD District 1 where sales fell by nearly one third and where the losses more than made up for the small volumetric increases elsewhere in the district.

Despite the fact that sales of residual fuel oil to the industrial sector fell at the national level, regional sales were somewhat mixed. The largest drop occurred along the East Coast where sales fell by a total of 451 million gallons and accounted for approximately 91 percent of the total decline in sales to the industrial sector. Sales in the Gulf Coast, Rocky Mountain, and West Coast regions of the country increased somewhat. It should be noted that although the increases appear significant in percentage terms the volumetric gains amounted to less than 4 percent of total residual sales to the industrial sector.

Overall, total sales to the commercial sector declined by 76 million gallons (11.7 percent). However, on a regional basis, sales were mixed. The bulk of the drop in sales occurred in Central Atlantic and Lower Atlantic portions of PAD District 1 where sales in the two regions fell by approximately 73 million gallons. The remainder of the decline in sales occurred in PAD Districts 3, 4, and 5 but amounted to less than 6 million gallons in total. On a volumetric basis, sales to the commercial sector increased very slightly (by approximately 3 million gallons) in the New England portion of PAD District 1 and in PAD District 2.

The downward trend in sales of residual fuel oil to the military continued during 2002.¹⁵ On a regional basis, sales fell sharply in the three PAD Districts (1, 2, and 5) where sales to the military were recorded.¹⁶

Kerosene

Sales of kerosene fell in all consuming sectors. Total sales decreased by 445 million gallons, a drop of 40.1 percent. Sales fell the most in the residential sector, down 260 million gallons (37.0 percent). Sales to the

¹³It should be noted that the ability to increase production of light higher-value products does not typically mean that refineries with upgraded processing capacity no longer possess the ability to produce heavier products such as residual fuel; rather, the economics involved dictate the production of the higher value products.

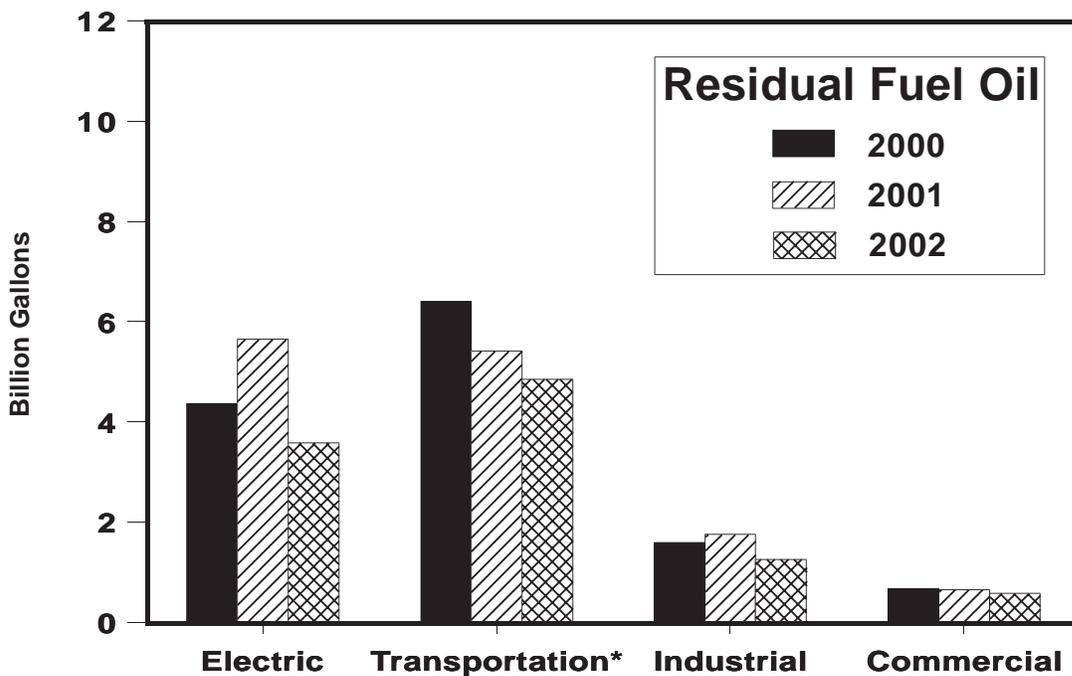
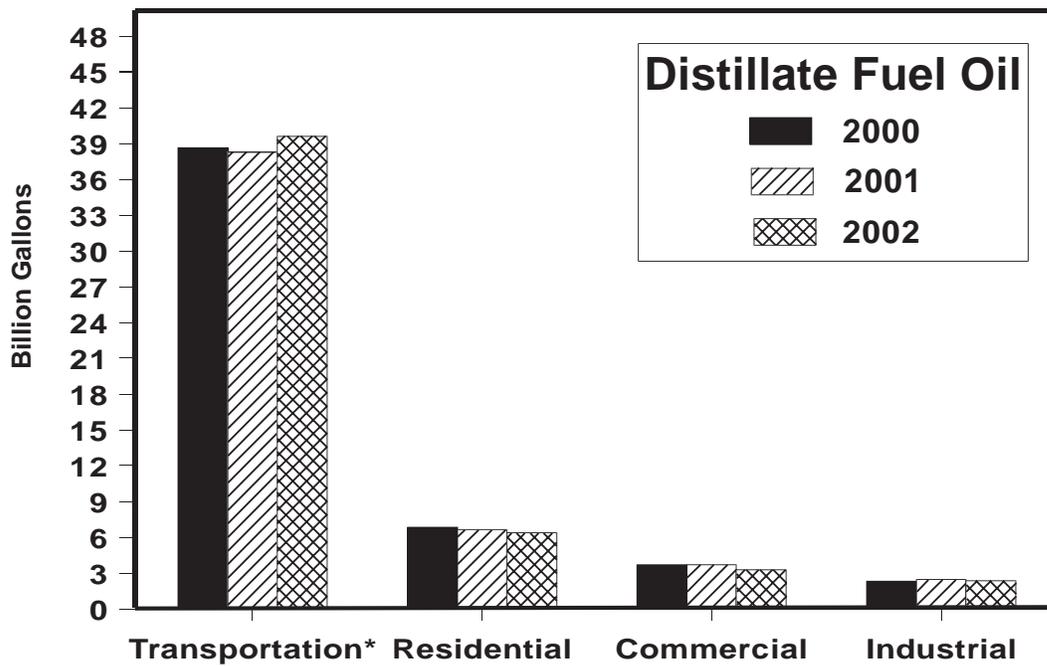
¹⁴Due to the divestiture of many electric power generation facilities, changes in fuel use and plant operations also contributed to the decline of residual fuel oil. For example, operators of these merchant plants blend fuels to achieve greater efficiency and to lower emissions of dirtier fuels (oil blended with natural gas and even oil and coal). When it is advantageous, the operators also may purchase power rather than generate electricity and re-sell the fuel.

¹⁵Since 1997, sales have fallen by approximately 92 percent.

¹⁶No sales of residual fuel to the military were recorded in PAD District 3 or 4 in either 2001 or 2002.

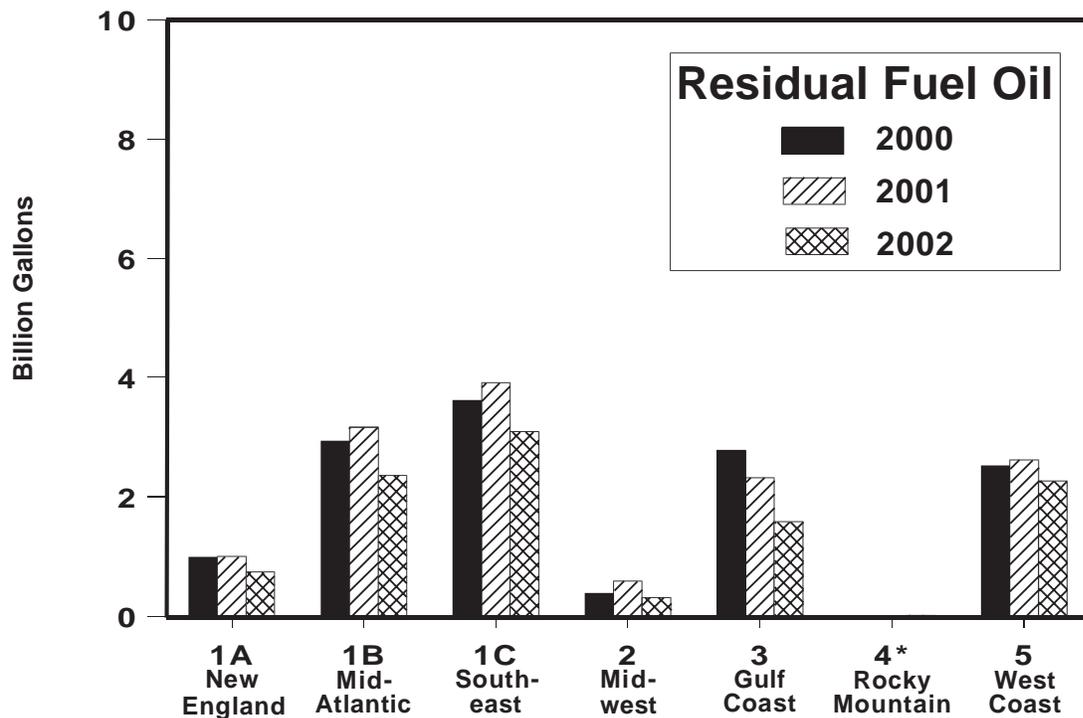
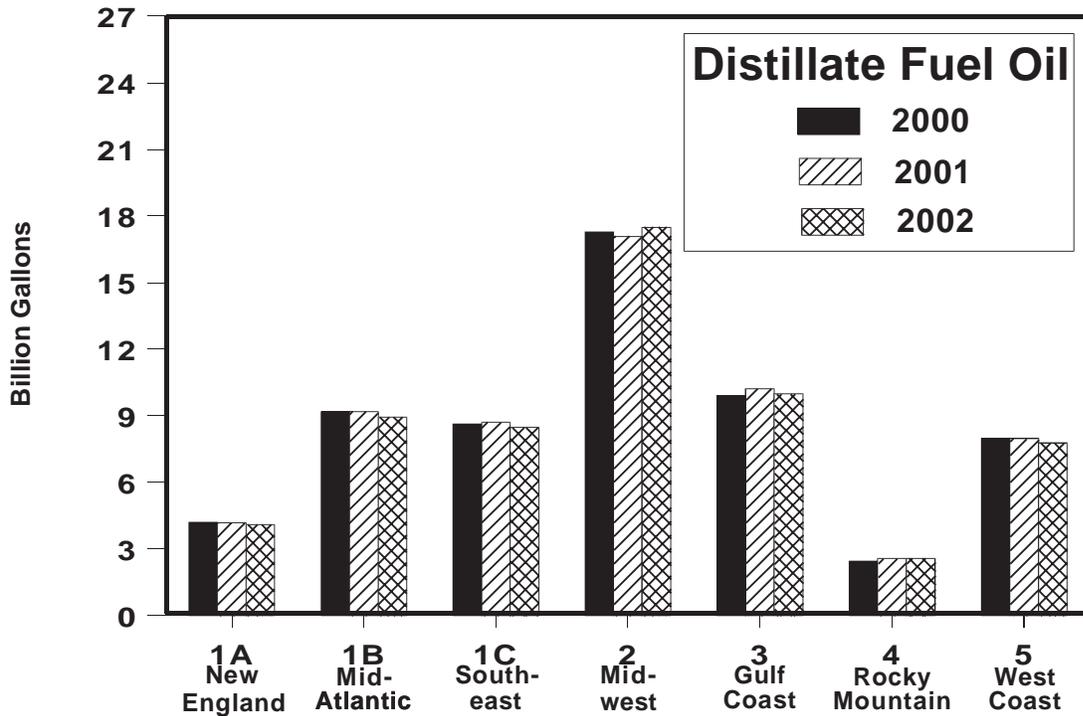
commercial sector fell by 114 million gallons (49.2 percent). Sales to the industrial and farm sectors also fell by 45.2 percent and 28.6 percent, respectively.

Figure HL1. U.S. Sales of Distillate and Residual Fuel Oils by Energy Use, 2000-2002



*For distillate fuel oil, transportation use comprises railroad, vessel bunkering, and on-highway diesel energy use categories. For residual fuel oil, transportation use comprises the vessel bunkering energy use category.
 Sources: Energy Information Administration, Form EIA-821, "Fuel Oil and Kerosene Sales Report," 2001 and 2002.

Figure HL2. Volume Distribution of Distillate and Residual Fuel Oils by PAD District, 2000-2002

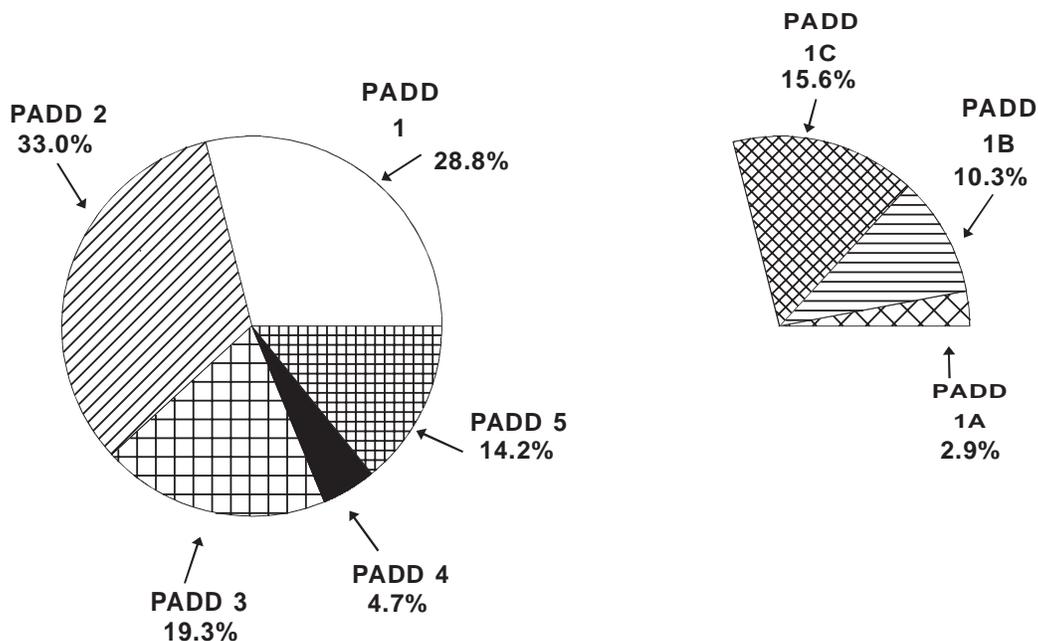


*Residual fuel oil sales in PAD District IV are too small to appear in this graph.

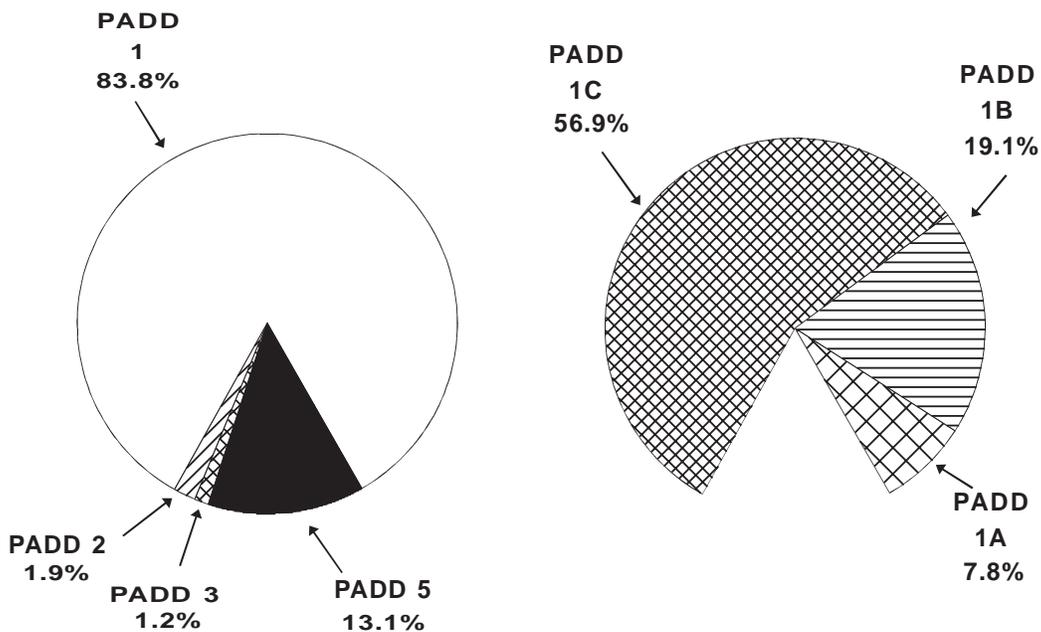
Sources: Energy Information Administration, Form EIA-821, "Fuel Oil and Kerosene Sales Report," 2001 and 2002.

Figure HL3. Distillate and Residual Fuel Oil Sales for Selected Energy Use Categories by PAD District, 2002

Distillate: Transportation



Residual: Electric Power



Sources: Energy Information Administration, Form EIA-821, "Fuel Oil and Kerosene Sales Report," 2002.